REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1-62 remain in the application, with claims 4-7, 19-21, 23-26, 31-42, and 45-62 having been withdrawn from consideration. Claims 2 and 18 have been amended. Editorial amendments have been made to correct typographical errors in several withdrawn claims.

In the Office Action, claim 18 has been objected to because of an informality in that the limitation "the FET" in line 3 should be -- a FET --. This objection has been addressed through the amendment of claim 18.

Claim 2 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "at least a part of one of the device" is unclear. The term "a part of one of" would indicate there is another element the circuit could be a part of. This rejection is traversed through the amendment of claim 2.

Claims 1-3, 8, 9 and 22 have been rejected under 35 U.S.C. 102(e) as being anticipated by Binnig et al. (US 7054257).

In regard to claim 1, Binnig et al. was cited as teaching a cantilever (citing fig. 2 element 11) disposed with a medium which is movable relative to the cantilever (citing fig. 2 element 16); a device associated with the cantilever and which is configured to be responsive to changes in electrical field between the medium and the cantilever caused by a change in distance between the medium and the cantilever (citing column 7 lines 10-30, and fig. 3 element 25); a heater disposed on the cantilever for selectively heating the medium and for inducing localized topographical changes which represent bits of data (citing column 6 lines 65-67 and column 7 lines 1-2, and fig. 4b element 36); and a circuit which electrically interconnects both of the device and the heater (citing fig. 4b).

This rejection is traversed. The Applicants respectfully submit that the invention defined in claim 1 includes features and combinations of features that are not shown or suggested by Binnig et al. In particular, claim 1 includes a device associated with the cantilever and which is configured to be responsive to changes in electrical field

between the medium and the cantilever caused by a change in distance between the medium and the cantilever. While column 7 lines 10-30 and fig. 3 element 25 of Binnig et al. were cited as showing this feature, the Applicants disagree with the Examiner's interpretation of Binnig et al. Binnig et al. shows a probe of the type discussed in the background section of the present application in paragraphs [0003] – [0008]. That is, Binnig et al. uses thermal sensing that responds to changes in the thermal conductance between a heating element and a storage medium. The field discussed in column 7 lines 10-30 of Binnig et al. is an area of the storage medium, not an electric field. Column 7 lines 10-30 of Binnig et al. describe a read process in which changes in the temperature of a heater result from changes in heat transport across a gap between the heater and the storage medium.

In regard to claim 2, Binnig et al. was cited as teaching that the circuit forms at least a part of one of the device. Since claim 2 depends from claim 1, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 1.

In regard to claim 3, Binnig et al. was cited as teaching that the circuit has portions which are common to both the device and the heater. Since claim 3 depends from claim 1, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 1.

In regard to claim 8, Binnig et al. was cited as teaching that the cantilever comprises a probe which extends from the cantilever and which is configured to be contactable with a surface of the medium and to respond to a topography of the medium to cause the distance between the cantilever and the medium to vary. Since claim 8 depends from claim 1, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 1.

In regard to claim 9, Binnig et al. was cited as teaching that the medium is electrically non-conductive and is supported on an electrically conductive substrate (column 6 lines 62-64). Since claim 9 depends from claim 1, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 1, and for the following reason. The Applicants respectfully submit that Binnig et al. does not

disclose or suggest that the medium includes an electrically conductive substrate. Column 6 lines 62-64 of Binnig et al. refer to a silicon substrate. It is well known that silicon is a semiconductor, rather than a conductor.

Claim 22 has been rejected for the same reasons as in the rejection of claims 1 and 9.

This rejection is traversed. The Applicants respectfully submit that the invention defined in claim 22 includes features and combinations of features that are not shown or suggested by Binnig et al. In particular, claim 22 includes a device formed in the cantilever which responds to a change in electric field induced by a change in distance between the cantilever and a substrate on which the medium is supported. While column 7 lines 10-30 and fig. 3 element 25 of Binnig et al. were cited as showing this feature, the Applicants disagree with the Examiner's interpretation of Binnig et al. Binnig et al. shows a probe of the type discussed in the background section of the present application in paragraphs [0003] – [0008]. That is, Binnig et al. uses thermal sensing that responds to changes in the thermal conductance between a heating element and a storage medium. The field discussed in column 7 lines 10-30 of Binnig et al. is an area of the storage medium, not an electric field. Column 7 lines 10-30 of Binnig et al. describe a read process in which changes in the temperature of a heater result from changes in heat transport across a gap between the heater and the storage medium.

Claims 10-18, 27-30 and 43-44 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Binnig et al. in view of Azuma et al. (US 6477132).

In regard to claims 10 and 27, Binnig et al. was cited as teaching all the elements of claim 10 except wherein the device is a FET (Field Effect Transistor). Azuma et al. was cited as teaching wherein the device is a FET (Field Effect Transistor) (column 18 lines 29-37).

The two are analogous art because they both deal with the same field of invention of recording on a medium. According to the Office Action, at the time of the invention it would have been obvious to one of ordinary skill in the art to provide the apparatus of Binnig et al. with the FETs of Azuma et al. The rationale is as follows: At the time of the invention it would have been obvious to provide the apparatus of Binnig et

al. with the FETs of Azuma et al. because FETs can act as switches that are small and use very little power.

Since claims 10 and 27 depend from claims 1 and 22 respectively, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejections of claims 1 and 22, and for the following reasons. While Azuma et al. discloses the use of FETs, the FETs of Azuma et al. do not respond to a change in electric field induced by a change in distance between the cantilever and a substrate on which the medium is supported. More particularly, the FETs described at column 18 lines 29-37 of Azuma et al. are used as switching devices 47 in fig. 15 to control the application of a recording voltage.

In regard to claims 11 and 28, Azuma et al. was cited as teaching wherein the circuit comprises a plurality of electrically conductive traces which are formed in the cantilever and which comprise a source and a drain of the FET and wherein the source or drain of the FET forms part of a circuit which supplies electrical current to the write/read tip (fig. 1).

Since claims 11 and 28 depend from claims 10 and 27 respectively, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejections of claims 10 and 27, and for the following reason. The Applicants respectfully submit that fig. 1 of Azuma et al. does not show a plurality of electrically conductive traces which are formed in the cantilever and which comprise a source and a drain of the FET.

In regard to claim 12, Azuma et al. was cited as teaching wherein the plurality of electrically conductive traces further comprise a channel interposed between the source and the drain of the FET (citing fig. 1 the wire connecting the source and the drain).

Since claim 12 depends from claim 11, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 11, and for the following reason. The Applicants respectfully submit that fig. 1 of Azuma et al. does not show a plurality of electrically conductive traces which are formed in the cantilever and which comprise a source and a drain of the FET.

In regard to claim 13, Binnig et al. was cited as teaching wherein the cantilever is made of silicon and the electrically conductive traces are formed by doping the silicon to render selected regions electrically conductive (citing column 6 lines 56-59).

Since claim 13 depends from claim 11, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 11.

In regard to claim 14, Binnig et al. was cited as teaching wherein the heater comprises a doped region having an electrical resistance which is higher than the traces (citing column 15 lines 20-21).

Since claim 14 depends from claim 11, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 11, and for the following reason. The Applicants respectfully submit that column 15 lines 20-21 of Binnig et al. do not disclose or suggest that the heater comprises a doped region having an electrical resistance which is higher than the traces.

In regard to claims 15 and 44, Binnig et al. was cited as teaching wherein the cantilever has a pair of arms which are interconnected by a bridge member (fig. 5 element 45), wherein the probe is formed on the bridge member (fig. 5 element 47), wherein the heater is formed on the bridge member and wherein the doped traces are formed on both arms (citing fig. 4b element 39 and column 6 lines 56-59).

Since claim 15 depends from claim 14, the rejection of claim 15 is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 14. In addition, since claim 44 depends from claim 43, the rejection of claim 44 is traversed for the reasons set forth below with respect to the traversal of the rejection of claim 43.

In regard to claim 16, Binning et al. was cited as teaching feeding a heater element with a current (citing figs. 4 and 5). Azuma et al. was cited as teaching feeding the probe with a current driven by a FET (citing fig. 1 elements 201-205).

Since claim 16 depends from claim 10, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 10, and for the following reasons. The Applicants respectfully submit that the cited references do not

disclose or suggest the use of an FET as a heater. More particularly, the FET of fig. 1 of Azuma et al. does not function as a heater.

In regard to claims 17 and 29, Azuma et al. was cited as teaching an induced channel FET (citing column 7 lines 19 and 20).

Since claims 17 and 29 depend from claims 10 and 27 respectively, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejections of claims 10 and 27.

In regard to claim 18, Binning et al. was cited as teaching wherein the medium is electrically non-conductive and is supported on a substrate which is electrically conductive (citing the rejection of claim 9), and wherein the substrate is configured to be circuited with the tip so that variations in the electrical field which result from a change in distance between the medium and the cantilever, induces a change in electrical current passing through the tip, and produces a read signal (citing the rejection of claim 1).

Since claim 18 depends from claim 3, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 3.

In regard to claim 30, Azuma et al. was cited as teaching wherein the cantilever is formed of silicon and the tip comprises a doped portion which is electrically connected with doped regions that form a source and a drain of the FET (citing fig. 1, and column 6 lines 24-33).

Since claim 30 depends from claim 27, this rejection is traversed for the reasons set forth above with respect to the traversal of the rejection of claim 27.

In regard to claim 43, Azuma et al. was cited as teaching FET means formed in a silicon cantilever by doping electrically conductive source and drain regions in a selected surface of the cantilever (citing fig. 1 and column 6 lines 24-33), for being gated by an electric field which is generated by applying a bias to a substrate separate from the cantilever (citing fig. 15 element 45); a probe on the selected surface of the cantilever (citing fig. 15 elements 11 and 12).

Binning et al. was cited as teaching heater means in the cantilever proximate the probe for heating and forming a data bit indicative topography in a medium to be engaged by the probe (citing fig. 4 element 39).

This rejection is traversed. The Applicants respectfully submit that the invention defined in claim 43 includes features and combinations of features that are not shown or suggested by Azuma et al. In particular, claim 43 includes FET means including source and drain regions for being gated by an electric field which is generated by applying a bias to a substrate separate from the cantilever. Contrary to the assertions of the Office Action, the Applicants respectfully submit that fig. 15 element 45 of Azuma et al. does not disclose or suggest that the source and drain regions of the FET can be gated by applying a bias to a substrate that is separate from the cantilever.

All claims in the application are believed to be in allowable form. Allowance of the application is requested.

Respectfully submitted,

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